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## The family Strongylophthalmyiidae of Poland with catalog of European species (Insecta: Diptera)

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ABSTRACT. Data on morphology, biology and distribution of two species of the family Strongylophthalmyiidae occurring in Poland are presented. Photographs of wings and male terminalia as well as new faunistic data, short ecological and phenological notes for *Strongylophthalmyia pictipes* FREY, 1935, which was recorded outside northern Europe for the first time, and *Strongylophthalmyia ustulata* (ZETTERSTEDT, 1847) are given. The updated catalog of the family Strongylophthalmyiidae in Europe is provided and currently includes three species. A key to species is given.

Key words: entomology, faunistics, Strongylophthalmyiidae, *Strongylophthalmyia pictipes*, *S. ustulata*, *S. paula*, Poland, distribution, phenology, catalog, decaying tree, key to European species.

### INTRODUCTION

Strongylophthalmyiidae is a small family represented by two genera: *Nartshukia* SHATALKIN (known from a single species) and *Strongylophthalmyia* HELLER. Currently the family contains 46 described species (BARBER 2006, LONSDALE 2013) of small (2.0–6.0 mm), slender and long-legged Acalyprate flies. They are known mainly from Oriental Realm, with only eight species reported from the Palearctic (SHATALKIN 1993, KRIVOSHEINA 1999) and two from the Nearctic Region (BARBER 2006).

The European Strongylophthalmyiidae are typical representatives of dipteran fauna in the natural deciduous forests. The biology of the European species is poorly known, although the larvae live under the bark of dying or decaying deciduous trees. Adults occur on low vegetation in wet forests near the breeding sites of the larvae. So far as it is known, Palaearctic species *Strongylophthalmyia stackelbergi* KRIVOSHEINA, 1981 have been reared from under the bark of rotting birch and elm, while *S. pictipes* and *S. ustulata* from aspen. The larvae were found in the lower layers of the bark, while puparia were common in the outer layers (KRIVOSHEINA 1984). Pupa of *S. ustulata* was described by ROTHERAY & ROBERTSON (1998). Larvae of Strongylophthalmyiidae have not been described in detail, although MAMAEV et al. (1977) gave drawings and a few details for *S. ustulata*.

All species of Strongylophthalmyiidae, including widely distributed *Strongylophthalmyia ustulata* are rare in Europe and thus they are infrequent in collections.

Up to now, there has been no study on the Strongylophthalmyiidae of Poland. Only one species – *Strongylophthalmyia ustulata* – has been recorded from scattered localities in this country, based on only single specimens (SÉGUY 1934, KARL 1936, HENNIG 1941, PALACZYK & KLASA 2003).

The aim of this paper is to present the current state of knowledge on *Strongylophthalmyia* species known in Poland as well as provide an up-to-date catalog of this family in Europe.

#### MATERIAL AND METHODS

The study is based on the examination of 35 specimens of the family Strongylophthalmyiidae deposited in the Polish collections. Adults were collected by entomological hand net. Part of the material was preserved in 75% alcohol and some individuals as dry mounted specimens. Descriptions are given based on dried specimens. Some specimens were macerated in 10% KOH (24 hours, room temperature) for detailed examination. Macerated specimens were mounted on microscopic slides. The photographs of wings were taken using a Nikon D90 digital camera while pictures of male terminalia using a Nikon E8400 digital camera mounted on Olympus SZX7 stereomicroscope.

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## REVIEW OF THE SPECIES OF THE FAMILY STRONGYLOPHTHALMYIIDAE IN POLAND

***Strongylophthalmyia pictipes* FREY, 1935**

(Figs 1, 3-4, 6, 8, 10, 15-17)

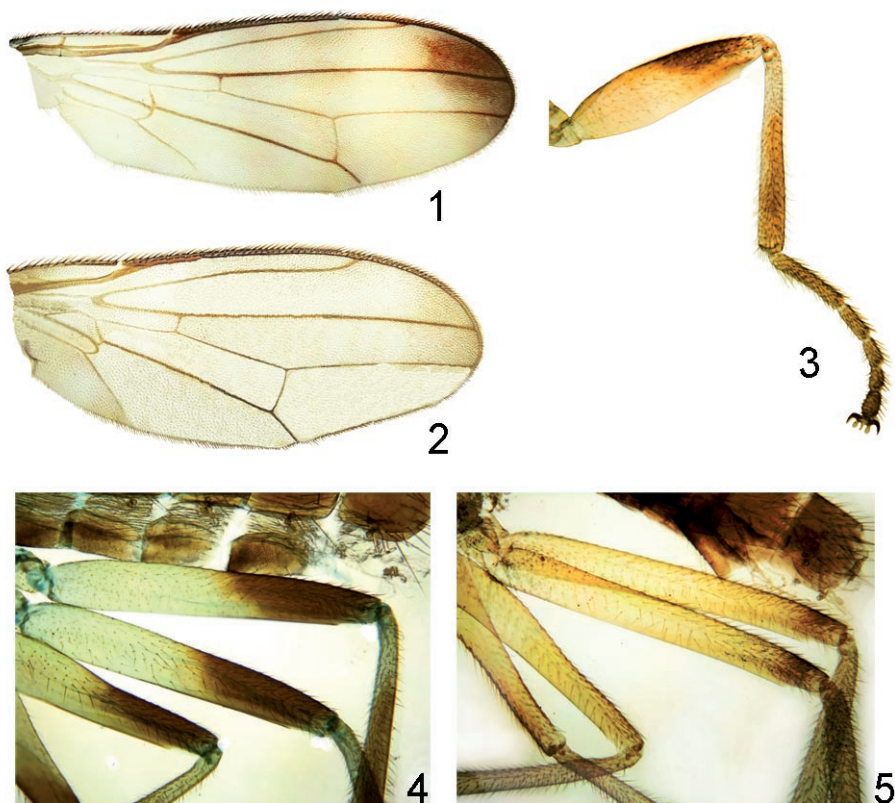
## MATERIAL EXAMINED

11 specimens (all males).

**POLAND. Bieszczady Mts.:** Terebowiec Valley, 720 m, 29 VI 2010, 3♂♂, 02 VII 2010, 4♂♂, 03 VIII 2010 5♂♂, leg. AK, AP.

## MORPHOLOGY

Male (Fig. 16): face, gena and frons between base of antennae and ocellar triangle yellow, occiput and posterior part of frons black, shining. Ocellar triangle black. All the bristles on the head brown to black. Post verticals divergent, 2 pairs of verticals, 2 pairs of orbitals and 1 pairs long and slender ocellars. Lower postocular bristles numerous and hair like. Antennae yellowish brown, postpedicel large and roundish, arista short-



1, 2. Male wing: 1 – *Strongylophthalmyia pictipes*, 2 – *S. ustulata*; 3. *S. pictipes* – fore leg (ventral view); 4, 5. Femora: 4 – *S. pictipes*, 5 – *S. ustulata*



6. *Strongylophthalmyia pictipes* – palpi and mouth parts; 7. *S. ustulata* – palpi; 8, 9. Hypopygium: 8 – *S. pictipes*, 9 – *S. ustulata*; 10, 11. Apex of aedeagus: 10 – *S. pictipes*, 11 – *S. ustulata*; 12. *S. ustulata* – ovipositor; 13. *S. ustulata* - apex of ovipositor



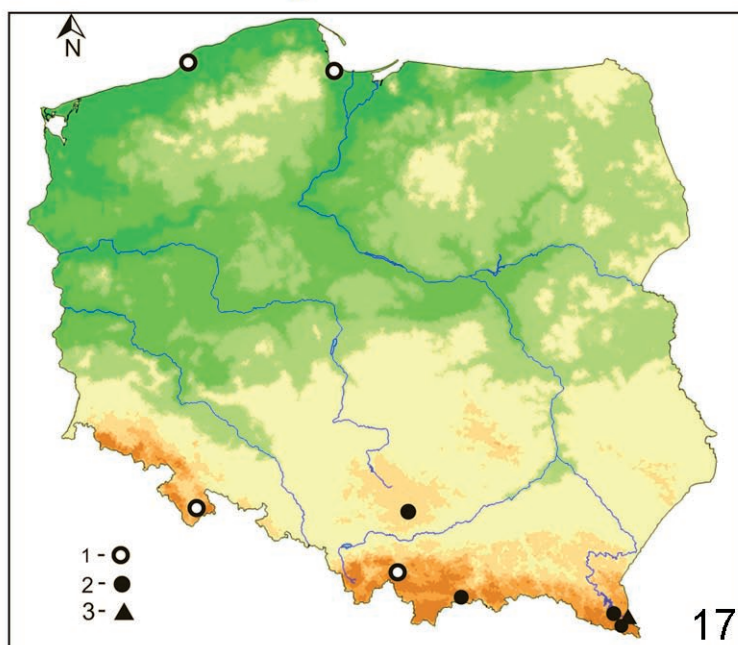
haired. Palpi black, relatively short and wide (Fig. 6). Mesonotum black and shining with numerous pale hair, 1 pair of black, long prescutellar dorsocentral bristles. Scutellum bare with 1 pair of long and black apical bristles. Pleurae dark brown to black, shining.



13. *Strongylophthalmyia ustulata* – female; 14. Bieszczady Mts. (Terebowiec Valley) – locality of *S. pictipes* and *S. ustulata*



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16. *Strongylophthalmyia pictipes* - male. 17. Distribution of *Strongylophthalmyia pictipes* and *S. ustulata* in Poland: 1. *S. ustulata* – published data, 2. *S. ustulata* - new data, 3. *S. pictipes*

Katepisternum in upper part with some white hairs. Wings with median crossband (in male poorly marked) and distinct black apical spot (Fig. 1). Halteres yellow. Legs long and slender. Coxae in anterior side with long, whitish hairs. Middle and hind femora yellowish brown in basal part and dark brown to black in apical half (male) (Fig. 4). Fore femora slightly thickened and dorsally in apical half darkened (Fig. 3). Middle femora with a row of 5-9 yellow bristles at base beneath. Middle tibiae with a black, short and thick ventral apical spur. The first three segments of tarsi yellowish brown, last two dark brown. Abdomen dark brown to black with long, dark hairs. Hypopygium as in the Fig. 8. Aedeagus not dilated apically (Fig. 10).

Female: similar to male except as follows: whole frons dark brown to black. Middle and hind femora dark brown to black in apical third only. Wings with more distinct median crossband (female description after SHATALKIN 1993 and KRIVOSHEINA 1999).

Body length: 4.3-4.8 mm.

#### NOTES OF BIOLOGY AND ECOLOGY

All specimens (males only) of this species were collected in wet deciduous forest (*Alnetum incanae*) on dead trunk (about 25 cm diameter) of aspen (*Populus tremula*) on the ground near the stream (Fig. 15). Immature stages of *S. pictipes* have not been described so far, although some specimens of this species have been reared from under the bark of rotting aspen by KRIVOSHEINA (1981).

In Terebowiec Valley adults were found from the end of June to the beginning of August.

#### DISTRIBUTION IN POLAND.

This is the first record of *S. pictipes* in Poland and also in Europe outside Scandinavia and northern Russia.

#### GENERAL DISTRIBUTION.

So far *S. pictipes* has been known in Europe only from Scandinavia and the Moscow region. In Asiatic part of Russia this species was also found in Amur region and Buriatia. Its occurrence in Polish East Carpathians is rather unexpected. This new record is from location about 1200 km south west from the nearest known locality in Moscow region.

*S. pictipes* is probably the boreomontane species in Europe. The Carpathian locality possibly represents the Late-Pleistocene (Alleröd) or Early-Holocene (Preboreal) relict population. The Alleröd period (11 800-11 000 B.P.) was characterised by continental climatic conditions warm enough to enable the rapid spread of forests in the Carpathians (OBIDOWICZ 1996).

#### COMMENTS

Hypopygium of Polish specimens of *S. pictipes* is quite similar to drawings given by KRIVOSHEINA (1981, 1999). Overall morphological features are similar to short description given by mentioned author, except palpi which are relatively wide and short, significantly wider than in *S. ustulata* (Fig. 6 and 7).



*Strongylophthalmyia ustulata* (ZETTERSTEDT, 1847)

(Figs 2, 5, 7, 9, 11-14, 15, 17)

## MATERIAL EXAMINED

24 specimens (11♂♂, 13♀♀).

**POLAND. Kraków-Wieluń Upland:** Bentkowska Valley, near Kraków, 16 VI 1990, 1♂, leg. AP, **Western Beskidy Mts.:** Babia Góra Mts. – Zawoja Markowa, 700 m, 26 VI 1996, 1♂, leg. AP, **Pieniny Mts.:** Biały Stream, 560 m., 26 VI 2002, 1♀, leg. ISK, **Bieszczady Mts.:** Terebowiec Valley, 720 m, 29 VI 2010, 2♂♂, 3♀♀, 02 VII 2010, 3♂♂, 3♀♀, 03 VIII 2010, 4♂♂, 6♀♀, leg. AK, AP.

## MORPHOLOGY

Male: face, gena and frons between base of antennae and ocellar triangle yellow, posterior part of frons and occiput black, shining. Ocellar triangle black. All the bristles on the head bright, whitish or yellow. Post verticals divergent, 2 pairs of verticals, 2 pairs of orbitals and 1 pair long and slender ocellars. Lower postocular bristles numerous and hair like. Antennae yellow, postpedicel large and roundish, whitish yellow, arista relatively long haired. Palpi brown, long and narrow (Fig. 7). Mesonotum black and shining with numerous pale hair, 1 pair of pale, long prescutellar dorsocentral bristles. Scutellum bare with 1 pair of long and pale apical bristles. Pleurae dark brown to black, shining. Katepisternum in upper part with some white hairs. Wings relatively wide with a weak and indistinct apical dark spot (Fig. 2). Halteres yellow. Legs long and slender, yellow. Coxae in anterior side with long, whitish hairs. Only hind femora with narrow, dark apical band, middle femora sometimes darkened in tip (Fig. 5). Fore femora slender, yellowish brown, not darkened dorsally. Middle femora with a row of 5-7 yellow bristles at base beneath. Middle tibiae with a brown ventral apical spur, longer and more slender than the *S. pictipes*. Abdomen dark brown to black with long, whitish hairs. Hypopygium as in the Fig. 9. Aedeagus dilated apically (Fig. 11).

Female (Fig. 14): similar to male except as follows: post vertical, vertical, orbital, ocellar, dorsocentral and scutellar bristles dark to black, antennae and posterior tibiae darker, light brown. Apex of ovipositor as in the Fig. 13.

Body length: 4.6-5.2 mm; wings length: 3.7-4.1 mm.

## NOTES OF BIOLOGY AND ECOLOGY.

*S. ustulata* occurs in natural forest with large amount of rotting wood (ROHÁČEK 1999) and is rarely recorded in Europe. In the Bieszczady Mts. (Terebowiec Valley) both species *Strongylophthalmyia ustulata* and *S. pictipes* occur in the same place (Fig. 15). We have collected several specimens of *S. ustulata*, but only two on trunk of aspen together with *S. pictipes*. We have found most of them running on the leaves of *Petasites kablicianus* on the bank of a stream. Our observations are consistent with data of SHATALKIN (1993), who states that *S. ustulata* is found mainly on leaves of herbs and shrubs, unlike adults of *S. pictipes*, which occur only on fallen trunks and stumps.

Larvae have not been described in detail, although MAMAEV et al. (1977) gave good drawings of habitus of larva and some morphological details (anterior and posterior



spiracle, head skeleton). Puparia of *S. ustulata* collected in decaying aspen have been described by ROTHERAY & ROBERTSON (1998) and some specimens of this species have been reared from under the bark of rotting aspen by KRIVOSHEINA (1981).

In Poland the adults were found from mid-June to the beginning of August.

#### DISTRIBUTION IN POLAND.

*Strongylophthalmyia ustulata* is known from scarce findings only in northern (Baltic Sea Coast) and southern Poland (Sudeten Mts. and Carpathians Mts.). Previously this species was reported from Gdańsk (SÉGUY 1934), Darłowo (KARL 1936), Międzygórze (HENNIG 1941) and Babia Góra Mts. (PALACZYK & KLASA 2003). During the present study this species was found for the first time in the Bieszczady Mts., Pieniny Mts. and Kraków-Wieluń Upland (Fig. 15).

#### GENERAL DISTRIBUTION.

*Strongylophthalmyia ustulata* is widespread, but rare species in Europe, known from the Great Britain and Andorra to Ukraine and the Ural Mts. In the eastern Palearctic this species also was reported from southern Siberia (Amur region and Buriatia) in Russia, Japan and North Korea.

#### COMMENTS

Hypopygium of Polish specimens of *S. ustulata* is quite similar to the drawings in KRIVOSHEINA (1981, 1999) and STEYSKAL 1971, but differs (especially in hypandrium) from a drawing given by IWASA (1998).

#### CATALOG OF THE FAMILY STRONGYLOPHTHALMYIIDAE IN EUROPE

In the Fauna Europea Web Database (PAPE & BEUK 2013) and in most publications (e.g. OOSTERBROEK 2006, KAHANPÄÄ 2006, ROHÁČEK 2009, GAMMELMO & SØLI 2011) only two species belonging to the family Strongylophthalmyiidae are given from Europe. These are: *Strongylophthalmyia ustulata* and *S. pictipes*.

One species, *Strongylophthalmyia paula* SHATALKIN, 1993 has been overlooked by all these authors. This species had been described by SHATALKIN (1993) from the Far East of Russia (Kurile Islands and Primorsky Krai) and the Moscow region.

Moreover in the Fauna Europea Web Database (PAPE & BEUK 2013), information on the distribution of *Strongylophthalmyia ustulata* and *S. pictipes* is also incomplete. For that reason, we present updated data on the occurrence of all European *Strongylophthalmyia* species, which is based on the literature available to us.

#### ***Strongylophthalmyia paula* SHATALKIN, 1993**

*Strongylophthalmyia paula* SHATALKIN, 1993 – Type locality: Kurile Islands, Kunashir, surroundings of Mendeleev volcano (Russia)

#### **Europe**

**Russia:** Moscow region (SHATALKIN 1993, KRIVOSHEINA 1999).

**Asia**

**Russia:** Kurile Islands, Primorsky Krai (SHATALKIN 1993, KRIVOSHEINA 1999).

***Strongylophthalmyia pictipes* FREY, 1935**

*Strongylophthalmyia pictipes* FREY, 1935 – Type localities: Karislojo, Lojo, Pyhäjärvi (Finland)

*Strongylophthalmyia ustulata* var. *pictipes* FREY: HENNIG 1941

**Europe**

**Finland:** FREY 1935, HENNIG 1941, HACKMAN 1982, SILFVERBERG 1986, SHATALKIN 1993, KRIVOSHEINA 1999; **Norway:** GAMMELMO & SØLI 2011; **Poland:** locality in this paper (see above); **Russia:** Moscow region (SHATALKIN 1993, KRIVOSHEINA 1999); **Sweden:** LUNDQVIST 2013.

**Asia**

**Russia:** Amur district (SHATALKIN 1993, KRIVOSHEINA 1999); Buriatia (KRIVOSHEINA 1981, 1999, SHATALKIN 1993).

***Strongylophthalmyia ustulata* (ZETTERSTEDT, 1847)**

*Chyliza ustulata* (ZETTERSTEDT, 1847) – Type localities: Smolandia, Ostergothia (Lärketorp, Wadstena, Gusum), Helsingia (Storbyn) – (Sweden)

*Chyliza filata* (ZETTERSTEDT, 1847) – Type locality: Ostergothia (Sweden)

**Europe**

**Andorra:** CARLES-TOLRÁ & PUJADE-VILLAR 2003; **Austria:** FRANZ 1989; Czech Republic: CZIŽEK 1910, MARTINEK 1967, 1978, 1985, ROHÁČEK 1985, 1987, 1999, VAŇHARA 1981; **Estonia:** HENDEL 1902, HENNIG 1941, KRIVOSHEINA 1999; **Finland:** FREY 1917, 1935, TUOMIKOSKI 1930, HENNIG 1941, HACKMAN 1980, KRIVOSHEINA 1981, 1999, KAHANPÄÄ & SALMELA 2007; **Germany:** RADDATZ 1873, HENNIG 1941, SHATALKIN 2000, SCHACHT & HEUCK 2005, 2010; **Great Britain:** COLE 1981, MACGOWAN 1993, ROTHERAY & ROBERTSON 1998, ROTHERAY et al. 2001, ALEXANDER 2002; **Hungary:** PAPP 2001, 2003; **Latvia:** HENDEL 1902, HENNIG 1941, KRIVOSHEINA 1999; **Norway:** GREVE & SIMONSEN 1985; **Poland:** SÉGUY 1934, KARL 1936, HENNIG 1941, PALACZYK & KLASA 2003, (localities in this paper – see above); **Romania:** HENNIG 1941, CEIANU 1989; **Russia:** Ural (HENNIG 1941); Sankt Petersburg district (STACKELBERG 1958, STEYSKAL 1971); Karelia (POLEVOI 2006, HUMALA & POLEVOI 2009); Moscow region (KRIVOSHEINA 1981); European part of Russia (KRIVOSHEINA 1999); **Slovakia:** ROHÁČEK 1987, 1996, 2009; **Sweden:** ZETTERSTEDT 1847, WAHLGREN 1919, HENNIG 1841, RINGDAHL 1948, STACKELBERG 1958, HEDSTRÖM 1995; **Switzerland:** MERZ 1998a, 1998b, 2012; **Ukraine:** STACKELBERG 1958, 1970.

**Asia**

**Russia:** Amur region, Buriatia (KRIVOSHEINA 1981, KRIVOSHEINA 1999); **Japan:** IWASA 1995; **North Korea:** IWASA 1995.

## IDENTIFICATION KEY TO THE SPECIES OF THE STRONGYLOPHTHALMYIIDAE OCCURRING IN EUROPE

1. Wings with dark spot at least in apical part, arista short haired. Larger species, body length 3.2-5.0 mm. (Fig. 1 & 2 ) ..... 2.
- Wings hyaline, without dark spot and crossband, arista bare. Small species, body length 2.1-3.0 mm ..... *Strongylophthalmyia paula*
2. Wings with median crossband (in male poorly marked) and distinct black apical spot (Fig. 1). Middle and hind femora yellowish brown in basal part and dark brown to black in apical third (female) or half (male) (Fig. 4). Fore femora slightly thickened and dorsally in apical half darkened (Fig. 3). Palpi wide and relatively short (Fig. 6), black. Aedeagus not dilated apically (Fig. 10). Body length: 4.3-4.8 ..... *Strongylophthalmyia pictipes*
- Wings with a weak and indistinct apical spot (Fig. 2). Only hind femora with narrow, dark apical band, middle femora sometimes darkened in tip (Fig. 5). Fore femora slender, yellow, not darkened dorsally. Palpi long and narrow (Fig. 7), brown. Aedeagus dilated apically (Fig. 11). Body length: 4.6-5.2 mm ..... *Strongylophthalmyia ustulata*

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